ROCKS and MINERALS

Edited and Published by PETER ZODAC

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ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

(Formerly the Bulletin Board)

Clarence L. Brock of the American Mineral Exchange, Houston, Texas, was Chairman of a big fireworks show in Hermann Park, Houston. The sky show, one of the largest ever held in Texas, was part of the city's One Hundredth Birthday Celebration. Over 75,000 people saw the big event.

New Chapter Organized.

The first chapter of the Idaho Gem Club was organized on May 16, 1936 at Orofino, Idaho, with 20 members. Thomas B. Sayles is President; Boyd H. Olson, is Vice-Pres.; and Everett G. White is Secretary. Mr. Olson is a member of the Rocks and Minerals Association.

Coming

The December issue will be devoted entirely to articles on mineral trips. We believe the issue will prove of unusual interest to our readers as the majority of them greatly favor mineralogical trips. It will be the first number devoted entirely to this fascinating phase of mineralogy and we believe that every reader will look forward to it. If your subscription expires with this issue, rush in your renewal so that a copy of the December number may be reserved for you.

Fall Field Trip of the Rocks and Minerals Association Sunday, Nov. 8th, 1936 at 9:30 A. M.

Weather permitting, a field trip will be held Sunday, Nov. 8th, by the Rocks and Minerals Association. The activities will be centered around Peekskill, N. Y.

The trip will cover visits to various abandoned mines including arsenic, emery, "gold," iron, molybdenite, pyrrhotite, etc. Only brief stays will be made at each locality—just long enough to collect a few specimens.

The meeting place will be in front of the Rocks and Minerals office, 157 Wells St., Peekskill, N. Y., at 9:30 A. M.

A Successful Tour

Allan Caplan, dealer in rare and attractive mineral specimens, has recently returned to Boulder, Colorado, after a very successful tour of New York, Philadelphia and other points east, where he visited colleges, museums, private collectors and dealers. In many of the cities, Mr. Caplan exhibited choice gold and silver minerals, colorful crystallized specimens, and unusually rare species.

Just a Reminder

Only a few weeks more, and Christmas will be with us. We would like to remind our readers that subscriptions to ROCKS AND MINERALS make ideal Christmas gifts. Make some youngster happy by placing his or her name upon our mailing list.

A Correction

In the Sept.-Oct. issue, on page 154, first column, 15th line from the top, the last word should be **southwest.** Thus the line should read "Washington Harbor at the **southwest".** Will readers please correct this error in Mr. Dustin's very fine article "Agates of the Lake Superior Region."

As Others See Us

A mineral collector is said to be an individual who knows a great deal about very few minerals and keeps knowing more and more about less and less of them until finally he knows everything about none of them, whereas

A mineralogist is said to be an individual who knows very little about a great many minerals and keeps knowing less and less about more and more of them until finally he knows nothing about all of them; whereas

A mineral dealer is an individual who knows everything about all minerals but ends up knowing nothing about any of them, due to his dealings with mineral collectors and mineralogists.

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The Official Journal *of the* ROCKS and MINERALS ASSOCIATION

WHOLE No. 64

. . . FOSSIL IVORY . . .

by JOHN DAVIS BUDDHUE

Recent ivory is the product of several species of animals but in all cases it is the teeth, usually modified, of the animal. Thus the teeth of the hippopotamus furnish a small quantity of ivory. The tusk of the narwhal and walrus also furnish some ivory but by far the greatest part is from the African elephant (**Elephas africanus**). I intend to deal here principally with the ivory of the extinct mastodon (**E. primigenius**) which is found in enormous quantities in northern Siberia and also in Alaska.

Probably all of the Russian, Siberian and Alaskan ivory is the product of the mastodon altho Digby[1] mentions that he saw two tusks in a lot of ivory which differed from the usual type of mastodon tusk. These he thinks may be the lower tusks of the Miocene Mastodon (**Tetrabelodon angustidens**), or the tusks of another elephant (**E. antiquus**) which rather antedated the mammoth. To this may perhaps be added the fossil or sub-fossil ivory of the walrus, probably (**Odobaenus obesus**). The latter is easily distinguished from the mammoth ivory because the latter often shows faint parallel striations which I have never seen in the walrus product. Also the walrus ivory has a core thru much of its length which has a peculiar mottled appearance somewhat suggestive of tapioca pudding.

(1) *The Mammoth*, p. 176, Appleton and Co. 1926.

Mammoth ivory is found mostly as complete or nearly complete tusks. These are variable in size, but most are between nine and ten feet in length. The largest came from the Kolyma River in north east Siberia and measured 13 ft. 7 in. in length. This was the left hand one of a pair which weighed 185 and 166 pounds respectively. The other one was 12 ft. 9 in. long and shares second place with two others. The largest elephant tusks[2] were 11 ft. and 11 ft. 5 in. and together weighed 293 pounds. Some of the tusks found in less northerly districts approach the largest in size such as the one found at Dungeness, England which was 12 ft. long and weighed 200 pounds. Such ivory is usually poorly preserved due to the dampness and comparative warmth. It is true that much of the Siberian and Alaskan ivory is found either in rivers or the marshy tundras, but it must be remembered that below the first few feet the ground is eternally frozen. It is due to this fact that not only the tusks but the actual flesh of the mammoths is occasionally found preserved in the far north. Even so only about half of the ivory reaching London is fit for use.

Some of the ivory, however, is found as fragments which have been rolled along the beds of the streams or the beaches of the Arctic Ocean for years, probably even centuries.

(2) *Encyclopaedia Britannica*, 11th ed. Vol. XV. p. 93.

They are mostly dead white in color and rounded, often spindle shaped and frequently pitted.

The walrus ivory is probably mostly sub-fossil and is frequently fragmentary. Some of it has been worked into spear heads and sleigh runners by recent and pre-historic Eskimos. The tusks of both species of recent walruses rarely exceed 20 in. and the same can probably be said of the old ones.

The color of Siberian fossil ivory is exceedingly variable. That which is found encased in clear ice may be as white as elephant ivory but most of it is colored various shades of brown and tan, from pale cream to dark mahogany brown. Some of it has some shade of blue and when this is close to that of turquoise it is given the name odontolite and used as a substitute or imitation of the gem stone. The color is in all cases due to substances in the soil. The blue of odontolite is due to a phosphate of iron (vivianite), while the brown is probably due to the substances which color swamp water brown, such as the humic, ulminic, geic and other acids and perhaps their salts.

The color of all the Alaskan ivory which I have seen is dirty grey with sometimes a brownish tint. This is due to a surface layer of rotten ivory, underneath it has various shades of brown mottled with a dark bluish green. There are numerous longitudinal cracks from 1 to 3 mm. deep and sometimes filled with a black, probably humic, material. The larger of these have a border of dark brown edged with a band of the green mentioned above. The greenish color may be due to vivianite, to copper in some cases, or to some other cause. The brown is doubtless vegetable coloring matter. Underneath this is a layer averaging about a quarter of an inch in thickness of the so-called bark. Underneath this is white or yellowish ivory.

Much of the Siberian ivory is found near the mouths of the rivers which empty into the Arctic Ocean such as the Yenisei, Lena, Kolyma and others. Some is found also buried in ice or in the frozen tundra and is exposed by floods or landslides. Other pieces simply lie exposed on the surface or partly buried in the ground. In Alaska much of it is exposed in the gold placers or is dug up by the gold dredges from the ancient and modern river beds. A good deal of it is found free but occasionally whole skeletons, or more often the skull is found attached.

I am not acquainted with the walrus ivory locality but I presume that it is near the coast. All that I have seen is stained a coffee color and is occasionally spotted with green. The runners and spear heads are found in old Eskimo settlements.

The state of preservation of fossil ivory is exceedingly variable. Some, found encased in ice, is apparently as fresh as the day its owner died. Other pieces are badly cracked and seemingly changed into a chalky substance commercially worthless. Much of the Alaskan ivory that I have seen has shown a pronounced tendency to warp and separate into concentric layers like the annular rings of a tree. This phenomenon does not seem to occur in walrus ivory altho I have a specimen of apparent walrus ivory which shows it. However it may be the end of a small mammoth tusk. The tusks of the twenty (up to 1926) mammoths found frozen in the tundras are presumably as well preserved as their owners. All of the tusks of the elephantine creatures found in warmer parts of the world, at least all that I have seen, were poorly preserved. Most of them were badly discolored, warped, scaled and cracked, worse even than the bones associated with them.

Good quality ivory is white or yellow in color (excluding the outside), sectile, and about 4 in hardness. The specific gravity is not great, perhaps around 2 or 3. As decomposition takes place, the substance becomes progressively more and more like chalk. This substance is found as a coating on most Alaskan tusks and frequently occurs in more or less thick masses in the space between the rings caused by splitting. It can easily be shown that the cause of

this change is primarily the loss of organic matter. Good ivory blackens and almost takes fire when thrust into a flame. At the same time an odor like burning hair or horn is produced. Rotten ivory behaves similiarly except that there is much less odor and the carbon is quickly burned out of it leaving a white ash.

All of the mineral matter in ivory is soluble in dilute hydrochloric acid. Good ivory treated with this reagent becomes soft and elastic in the course of a few days. It remains opaque and the color becomes greyish yellow. On drying it becomes brown and transparent and shrinks considerably. When heated it fuses with decomposition and leaves a brittle deposit of carbon. At the same time the odor

FOSSIL IVORY FROM ALASKA
The small piece has been polished; the other is in the natural state.

of burning hair is produced. Rotten ivory is rapidly attacked by the acid leaving a foliated or porous yellowish mass of organic matter.

Good fossil mammoth and walrus ivory as well as some fossil teeth and bones fluoresce in ultra violet light. The color is pale bluish white and may be quite bright. Rotten ivory however is totally inactive except perhaps on freshly broken surfaces where the inner organic matter has been partly protected by the outer layers. The organic matter alone gives the same color while wet; after drying it is less fluorescent and the light it does give is perceptably greenish. Such organic matter as is obtainable from rotten ivory is not fluorescent, or only slightly so.

The composition of fossil ivory is essentially the same as any other tooth or bone, that is, it contains calcium, magnesium, phosphorous and carbon dioxide. I have been unable to find any analysis of any fossil ivory but as ivory is really dentine and the several analyses of dentines which I found were almost the same the following may give some idea of its composition. I did find however Hoppe-Seyler's analysis of the enamel of mastodon teeth. This also closely resembles other recent and fossil enamels.

	Dentine	Enamel
CaO	50.36%	52.82%
MgO	1.83	0.30
Cl	0.03	0.38
P_2O_5	38.60	39.62
CO_2	3.97	——
iron, water and alkalies	3.84	0.17
	98.63%	93.29%

Since the above was written I have acquired several fragments of blue odontolite from Simorre, France. These are somewhat variable in color from a shade a little darker than robin's-egg blue thru turquoise to quite a dark shade spotted with brown and dark grey. One piece is partly a delicate orchid color.

Odontolite differs from the Alaskan or Siberian variety both in origin and properties. In hydrochloric acid, it effervesces and dissolves completely. Heated in a flame, it assumes a very slight grey color and then quickly returns to the original blue showing that the original organic matter is virtually all gone. The fracture is poorly conchoidal like Alaskan ivory and the hardness is slightly greater. It did not come from the great mammoth of the north, nor for that matter from a mammoth at all, but from **Mastodon angustidens.** This was an elaphantine beast somewhat smaller than the mammoth, with four tusks, the two lower ones being very small, and the upper ones smaller by quite a good deal than those of the mammoth.

Aside from the color this ivory is indistinguishable in appearance from Alaskan ivory. At right angles from the length of the tusk it has the same peculiar zigzag or herringbone structure that is characteristic of mammoth and elephant ivory.

A practically complete skeleton of one of the extinct species of rhinoceros which in ages past inhabited North America, is on exhibition in Ernest R. Graham hall at Field Museum of Natural History, Chicago. It represents the species called Trigonias hypostylus, and was excavated from a quarry in Weld County, Colorado.

Trigonias lived about thirty million years ago, and was a rather small species of rhinoceros, being about six feet long and three and one-half feet in height. Unlike modern members of the family it had no horn on the nose. The quarry in which the specimen was found had been a shallow lagoon on the open plains, apparently. The rhinoceros, along with other larger and smaller animals of the time, probably frequented the lagoon as a drinking place. Many of these animals became mired and perished there, according to Elmer S. Riggs, associate curator of paleontology. The skeletons were covered and preserved by sediments washed in by surface water.

ULTRA-VIOLET LAMPS AND FILTERS

By CARL H. KLEIN

Much has been written regarding Ultra-Violet light; and its uses. Many articles have appeared in this and other magazines describing the phenomena of fluorescence in so far as they relate to minerals. Very little has been said, however, regarding the possible sources of it.

In this article, a short resume of some of these sources will be given, together with some little data on various types of filters. The characteristics of the various lamps described, and the manufacturers of them will be found in the table on page 215.

The lowest priced lamp of any value to the amateur experimenter, is the 2 watt Argon glow lamp (also known as the Argon bulb). This lamp operates on any 110 volt lighting current and as little visible light is generated, the use of filters is not ordinarily necessary. The lamp bulb is filled with Argon gas and has two semi-circular electrodes spaced approximately 1 m. m. apart. A resistance coil is concealed inside the base. When current is applied, the gas is ionized, becomes conducting and is thrown into luminous vibrations about the electrodes, glowing with a soft purple glow or corona. On direct current, the negative electrode only glows, while with alternating current, first one and then the other electrode glows as it becomes negative. On 60 cycle current, the alternations are so rapid, that both electrodes seem to be lighted constantly. The major portion of the ultra-violet generated by this lamp has a wave length of from 3300 to 3700 angstroms units. The life of this bulb should average well over 1000 hours.

Photoflood Lamps

The next source is the Mazda Photoflood lamp, available in two sizes, No. 1 having a life of 2 hours and No. 4 having a life of 10 hours when used on 115 volts, A. C. The amount of visible light generated by these lamps prohibits their use without a filter. In place of these, a type C X lamp is recommended. These are available in 60, 250 and 500 watts. The 60 watt size is about as effective as the type S-1 u. v. lamp described later. They may be used directly on a 110 - 120 volt line and have a life of about 500 hours. A special glass is used in the bulb which transmits most of the u. v. emitted by the filament. Filters must be used with these bulbs also. No. 587 filter is recommended.

Sun Lamps

The various sun lamp bulbs such as the S-1, S-2, G-1, and G-5 can also be used if proper filters of corex or other glass are provided. The S-1 is a very good source of u. v., but the usual fixtures in which it is used, together with the transformer of considerable size, makes it rather unsuitable for use as a portable unit. The S-2 lamp is approximately 1/10 as efficient as the S-1. These lamps must be used in a vertical position, base up.

The G-1 and G-5 lamps are much inferior to even the S-2 as an u. v. source. They also require the use of special transformers, etc. The G-30 and G-35 black-light lamps as made by one company for u. v. demonstrations are evidently type S bulbs equipped with purple corex - glass bulbs, in place of the standard white frosted special u. v. glass bulb ordinarily used. This fact accounts for the high price of the lamp.

In the writer's opinion, the CX lamp with filter will give results equal to the 'Black light' lamp at a much lower cost. The replacement cost is also very much less as it is not necessary to pay a high price for the corex glass bulb when the light source is renewed. No eye protection is needed when using this lamp.

Carbon-Arc Lamps

One of the most prolific sources of u. v. of all wave lengths is the carbon-arc using special carbons of the

B and C type. The "A" type carbons are also valuable. Type "A" or Sunshine carbon contain cerium and give a bluish-white light. The energy radiated gives a spectrum similiar to that of sunlight, extending thru the infra-red and u. v. to waves as short as 2800 A. U. and with a few scattered waves still shorter.

Type "B" carbon has a core containing iron. The light given off is bluish-white similar in appearance to that of the "A" carbon. The energy emitted however is mostly in the form of invisible light (ultra violet) and the visible light is much less than from type "A" carbons.

Type "C" carbons have a core con taining iron, nickel, aluminum and silicon and give a maximum of u. v., even greater than that of type "B". The distribution of light thru-out the entire u. v. range is much more uniform. A considerable amount of the light is in the range of 2700 to 3000 A. U. It is necessary to wear protective goggles or glasses when using all carbons, due to the irritating effect on the eyes from the short light waves emitted.

There are many makes and types of carbon-arc lamps from the low priced unit sold at the chain drug stores to the expensive type employed by physicians. The main difference is in the mechanical and electrical construction of the unit. The light developed depends upon the carbon used. The main objections to the carbon-arc is due to the great amount of heat generated, to the fumes and to the fact that considerable visible light must be filtered out. Heat resisiting red-purple ultra No. 587 filter glass seems to give best results with this type of lamp, altho red-purple ultra No. 597 and Corex A No. 986 can be used if one does not operate the lamp for such a length of time as to over heat them.

A lamp using 8 mm. carbons will require approximately 1000 watts at 110 volt to operate efficiently. The constant replacement of carbons, together with the comparatively large amount of power consumed, make these lamps relatively expensive to operate.

Iron Arc Lamps.

Iron arc lamps have been known and used for years for producing fluorescent effects. These units can either be purchased or constructed by the amateur at little expense. The iron arc is an excellent source of u. v. radiation as it is particularly rich in the shorter wave lengths. It delivers its maximum amount of radiation at a wave length of about 2600 A. U. Many minerals will fluoresce and phosphoresce when exposed to light from an iron arc which will not respond to any other light source excepting, perhaps, the type B and C carbon arcs. It is very necessary to give proper protection to the eyes when using this unit.

Light from the iron arc can be projected to considerable distances and if necesary, projected as a beam, by the use of a proper reflector. The amount of visible light generated by this light is low and in most cases, filters can be dispensed with. There is some damage of burn or shock connected with the using of this equipment, as voltages of up to 15000 are quite common. Violent radio interference is also generated by the iron arc and if used during the hours of broadcasting, many complaints from neighbors will be received, if not by the user, certainly by the power company.

Mercury Vapor Lamps.

There have been recently placed on the market, several types of lamps for use in general illumination. These lamps, known as high intensity mercury vapor lamps, are available in 250 and 400 watt sizes; they are quite rich in near u. v. radiation, and when used with filters, are excellent mediums for producing fluorescent and phosphorescent effects. Usable only on A. C. current, they have a high efficiency and a life of approximately 1500 hours. Operating temperatures are high and if the electric current is cut off while the lamp is burning, it will not re-establish its arc until it has cooled sufficiently to reduce the mercury vapor pressure.

A current limiting device, such as

a special transformer or reactor, must be used to limit the flow of the electric current and prevent it from reaching too high a value, as the resistance of the lamp changes during operation. It takes approximately 5 minutes to warm up the lamp to full brilliancy. It must be operated in a vertical position.

The lamp consists of an inner bulb of special high resistance glass containing the mercury and a small amount of starting gas, and an outer bulb. An arc discharge takes place between two electrodes sealed in the inner bulb and it is this arc which is the source of the light produced. The outer bulb serves to protect the inner one and assist in maintaining its high temperature during operation.

A new lamp of this type, consuming approximately 85 watts, is soon to be placed on the market. It will be known as the type H-3 Mercury lamp. Operating at 250 volts and drawing about 4 amperes, its life is rated at 500 hours. An inner tube of quartz, ⅜ of an inch in diameter, encloses the arc stream which has a length of ½ inch and a diameter of forty-thousandths. This small light source developes about 20,000 candles per square inch and its light output is about 3000 lumens. The outer tube of lime glass is about 2¼ x5⅝ inches. A pressure of one-half atmospheric is carried between the outer and inner bulbs. The inner bulb is at a pressure higher than atmospheric and there is a possibility that it may burst at the time of failure. This bursting may shatter the outer bulb and it is recommended that the lamp be operated behind a screen or other enclosure which will prevent particles of glass and quartz from scattering. A step-up transformer must be used to produce the necessary voltage. The characteristic blue-green color of mercury predominates in the light emitted.

Standard Cooper-Hewitt lamps are excellent u. v. sources but again, filters must be used to reduce the visible light emitted.

Nico Lamps.

The Nico Lamp is a modification of the above. A tube made of special lead glass to which nickel and cobalt salts have been added, replaces the standard clear tube and acts as a u. v. filter. This glass is of deep purple color. The light emitted has its maximum radiations in the range of 3100 to 3800 A. U. Made for use on either A. C. or D. C. current, this Nico Lamp may be found in use in practically all museums and in the homes of many individuals having fluorescent displays.

At present, the lamp is made in two sizes, 20 and 50 inch. While its first cost is a bit higher than many other u. v. sources, its efficiency, intensity, ease of installation and operation together with its comparitively low operating cost, makes it one of the finest pieces of equipment available for professional or amateur use. It is unnecessary to protect the eyes when using the Nico Lamp as very little of the far u. v. is emitted. The porcelain lined trough in which the tube is mounted acts as a reflector as well as a guard to prevent accidental breakage.

Cold Quartz Lamps.

During the past few years, considerable numbers of low pressure mercury lamps of the so called "cold quartz" type have appeared on the market. The majority of these have quartz tubes of varying lengths and bores, containing mercury together with some argon or other rare gas,, as a light source. The u. v. light generated by these lamps is considerable and the radiations peak at about 2536 to 2540 A. U. The quartz tubes are transparent to u. v. down to about 1850 A. V. Visible light is low and easily eliminated by filters. Small transformers allow the use of these lamps on 110 volt current of either A. C. or D. C. Many portable types are available. Current consumption is low and the life of the tube is, in most cases, well in excess of 1000 hours. Some manufacturers claim up to 20,000 hours of service. Operating temperatures are low and the lamps may be held in the hand without

discomfort. Instant lighting of the tube in any position with maximum efficiency is one great advantage these lamps have over units of various other types.

A typical spectrograph of the light emitted from a "cold quartz" tube shows considerable u. v. at 4358, 4047—4078, 3650, 3126, 3022, 2967, 2804 and 2652 A. U. with by far the greater amount of from about 2600 to 2480 A. U. Scattered bands at 3906, 3341, 2894, 2753, 2700, 2399, 2378, 2262, 2053, 2028, 1973, 1942 and 1849 A. U. are also noted together with a few other wave lengths.

From the foregoing it will be seen that this type of lamp with its maximum intensity in the middle u. v. region together with its excellent distribution in other wave lengths, is well suited for use as a producer of fluorescence and phosphorescence in minerals and other materials. The cost of these "cold quartz" lamps will run from $32.50 to approximately $110.00. From the writer's observation, it seems evident that the lamps of this type sold at the higher prices, primarily for medical use, are in no way superior to the lower priced units, as far as requirements for use by the average mineralogist is concerned.

Sunlight View Lamps

The illumination by sunlight filtered through a suitable medium such as No. 986 Red Purple Corex glass, also will produce fluorescence in most minerals having this property. Several styles of view boxes are available for this purpose and even the common Mazda clear bulb lamp produces some near u. v. which will activate many minerals. Naturally the visible light must be filtered out.

In view of the many types of u. v. sources available, no one should be without some sort of fluorescent collection. The larger and more expensive lamps will undoubtedly give better results than the small units, but from the view-point of cost, they are not always economically justified.

Filters

As filters play such an important part in this interesting study, it is well to include some information at this time. Practically all of the filter glasses used are made by the Corning Glass Works, Corning, N. Y., and those recommended in this article are procurable from this company in stock sizes of 2", 3⅛" and 6½" squares. For general purposes where extreme heat is not a factor, No. 597 red-purple ultra gives excellent results. No. 587 heat resisting red-purple ultra will stand considerable more heat than other glass, and although darker than No. 597, is an unusually good filter. No. 585 blue-purple ultra is also usable, but not recommended for general use. No. 584 red Ultra may be used to advantage with the various mercury lamps.

The writer personally prefers red-purple Corex A No. 986, as it undoubtedly gives better results than any other filter medium. It, however, is expensive and very easily broken, having low heat resistance and mechanical strength. It is the best transmitter of short wave u. v. available.

If it is desired to eliminate the red light which all filters pass to some degree, a plate of light shade blue-green No. 428 can be used in addition to the standard filter glass. The u. v. transmission is, however, considerably lessened by such procedure.

In spite of statements to the contrary, the proper reflector will do much toward increasing the effects obtained from the various lamps.

For the near u. v., silvered or porcelain reflectors are procurable which are quite satisfactory. The middle and far u. v., however, require the use of aluminum or chromium reflectors.

The table which follows gives a condensed resume of the lamps available and their characteristics.

Acknowledgement is made to the General Electric Company and to "Light" for information relating to certain light coverage outlined in the Table.

Unit	Supplier or Manufacturer	Watts	Approximate Maximum Effective Distance	Approximate Maximum Speed in ft.	Reflector	Recommended Filter	Average Price
Argon Glow Lamp	General Electric Co.	2	2 ft.	1 - 1½	polished aluminum	none or No. 986	50c
Photoflood No. 1	G.E.CO.—Westinghouse		9 ft.	8 - 10	"	No. 587	25c
"	"		6 ft.	6 - 8	"	No. 587 & 428	25c
"	"		NO DATA				$2
Mazda CX	"	60	3 ft.	2½ - 3½	"	No. 587	60c
"	"	250	10 ft.	7 - 9	"	No. 587	1.25
"	"	500	12 ft.	9 - 11	"	No. 587	2.25
Sunlamp S-1	"	450	12 ft.	12 - 15	oxidized aluminum	No. 597	5.45
Sunlamp S-2	"	175	8 ft.	8 - 10	"	No. 597	2.95
Sunlamp G-1	"		*3-4 ft.	*4-5 ft.	"	No. 597	
Black Light Bulb G-30	Westinghouse		*4-5 ft.	*5-6 ft.	"	none	9.25
Black Light Bulb G-35	"					none	12.00
Carbon Arc	Various	1000	up to 100 ft.	20 - 25	none	No. 587	$4 up
Iron Arc	John Grenzig; Ward's Nat. Science, Est		4-5 ft.	8 - 10	"	none	up to $35
*Spotlight (Baby)	Various	500	10 ft.	6 - 8	"	No. 587	$10 up
*Spotlight	"	1000	20 ft.	10 - 12	"	No. 587	$25 up
High Intensity Mercury Vapor	G.E.CO.—Westinghouse	250	10	8 - 10	oxidized aluminum	No. 584	10.00
"	"	400	15	12 - 15	"	No. 584	12.50
"	General Electric Co.	85	6-8	no data	available	No. 584	9.50
Nico 50 inch	" Ward's Nat. Sci. Est.	450	13	30 - 35	porcelain trough	none — nickel cobalt tube	45.00
Nico 22 inch	"	250	6-8	10 - 15	"	"	35.00
Cold Quartz	R. & M. Manu. Co. Ultra-Violet Prop. Inc.	30-up	8 ft.	6 - 8	aluminum	none or No. 986	32.50 up
"	Electro Therapy Pro. Corp.—John Obert	"			"		"
Sunlight Vision Boxes	Fisher Scientific Co. Ward's Nat. Sci. Est.						various

SOME MINERALS OF DELAWARE

By ALFRED C. HAWKINS

The State of Delaware, the next to the smallest of all in the United States, is the only one with a northern boundary that is a segment of a circle. It is said that William Penn stood on the court-house steps in the quaint old town of New Castle, and drew an arc with a radius of fifteen miles on the map, thus giving to Delaware a highly mineralized section which otherwise might have belonged to Pennsylvania (Penn's Woods).

It is in the region just north and west of the city of Wilmington that the greatest variety of minerals undoubtedly occur. The country rock in this vicinity is an ancient dark-colored gabbro, uninteresting enough except where it has been intruded by pegmatites or stringers of quartz which have come from granite below. There is one occurrence within the city limits of Wilmington which will illustrate the possibilities as to variety of mineral species at one locality. From a previous article* the present writer will quote the list of minerals found at the old Brandywine quarry. The quarry is located a quarter mile northwest of the Baltimore & Ohio Railroad bridge on Brandywine Creek.

It is at present used as a storage yard adjacent to a leather manufacturing plant.

The mineral species, all in the collection of the Natural History Society of Delaware in Wilmington, are as follows:

Apatite: bright crystals of a dark olive green color, showing prism, unit pyramid and base; somewhat twisted and distorted by rock movements; embedded in quartz.

Largest crystal observed, 2x5 cm.

Bornite: pure masses, iridescent, weighing altogether several pounds.

Calcite: white crystals, about 3x5 mm. in size.

Canbyite: a hydrated ferric silicate; dark brown and crystalline; thin layers on quartz.

Chabazite. well formed crystals, the largest observed being 0.8 cm. in diameter; colors, dark olive green, salmon, dark brown to light brown.

Chalcocite: associated with garnet and hisingerite.

Chalcopyrite: alone, and associated with bornite and pyrite.

Epidesmine (Stilbite): sheaf-like rosettes 1 mm. in diameter, composed of colorless, transparent crystals, associated with calcite and natrolite.

Garnet: fibrous crystalline crusts associated with hisingerite.

Hisingerite: associated with canbyite, garnet and sulphides.

Laumontite: opaque, cream-colored crystals 0.5 cm. long, on gabbro. Sharp free crystals showing prism and base, which are today in a good state of preservation.

Marcasite: coating surfaces of the rock, decomposing rapidly on exposure.

Natrolite: white and delicately acicular. Complete radiations, 2.2 cm. in diameter, crusts and veins. Associated with calcite, bornite and chalcopyrite, as are the other zeolites, which rest upon the sulphides.

Pyrite: brilliant simple cubes, 1 to 3 mm. in diameter.

Pyrrhotite: narrow stringers associated with other sulphides.

Quartz: small crystals on gabbro, associated with calcite and stilbite.

Stilbite: radiations 1.3 cm. in diameter, single crystals and sheaves 0.5 cm. in size; drusy surfaces; colors, gray-green, salmon, orange-yellow to white.

This quarry has now been abandoned for at least fifty years and it

scarcely seems likely that it will ever be operated again.

On the hills just west of Wilmington, between that city and Brandywine Springs, sillimanite occurs in loose masses at a number of places. This is a mineral of a light yellowish color with a bladed structure, and it is very tough. One large mass over a foot long had to be left there because the hammer would not break it. Probably it is still there.

The rocks along the northwest border of the State are mostly crystalline mica schists, with white crystalline marble in a valley at Hockessin, where pegmatite whose feldspar has decomposed into kaolin also occurs. No minerals of note were observed there, except some little blades of white tremolite in the marble, and tiny hornblende blades in the associated black schist. The locality will, however, bear watching.

The southern part of Delaware is a wide portion of the Coastal Plain, underlain by clay, sand, and marl. As in most of the marl belt, pits were operated many years ago. The most interesting mineral found in the marl is vivianite. Two crystals of this mineral once purchased by the writer are labeled "Whitlock's Pits, Middletown, Delaware". These are over 2 cm. in length, and individual crystals, with the form of long, tapering prisms, ending in sharp points. They are remarkable in having remained almost absolutely transparent. They also show the property of dichroism; that is, they appear blue when looked at through one direction of the prism, and distinctly green in another direction at right angles to the first. Perhaps pits at this locality will again be opened, as the popularity of marl as a fertilizer seems to be increasing.

Altogether, this State is far from devoid of minerals, and even the frequent mica books and plates that you can find along the roadside contain interesting microscopic inclusions. The beauty of the countryside will amply reward you for a trip, even though few minerals are found.

*** See *Canbyite, a New Mineral*; American Mineralogist, Vol. 9, No. 1, pp. 1-5, 1924.**

***Editor's Note*:— Dr. Hawkins is the author of *The Book of Minerals*, a recently issued book that is very popular with collectors.**

The world - wide circulation of ROCKS and MINERALS makes it a

vol. 53, No. 213, p. 36, Jan.-May 1914.

A STUDY OF THE SOUTH PASS AND ATLANTIC CITY MINING DISTRICT OF FREMONT COUNTY, WYOMING

By L. V. ABBOTT

In the early days, pioneers traveling the Oregon Trail followed the North Platte River through eastern Wyoming to the point where it was joined by the Sweetwater River, thence a short distance up that stream to Independence Rock, where they usually stopped to recuperate from their long and tiresome trek across the prairies. The rock covers some ten or fifteen acres or more, and is an immense igneous intrusion. Many centuries of weathering have brought it to the surface and it now stands about seventy five feet high—a notable landmark jutting out from the plain, and in pioneer days formed a wonderful watch tower for sentries to look for hostile Indians.

Continuing up the Sweetwater past Split Rock and many other rocky piles of origin similar to that of Independence Rock, the pioneers came, after nearly a hundred miles of travel to South Pass which was the lowest known pass across the Continental Divide.

The country for a distance of fifteen or twenty miles east of the divide is of an entirely different geological formation from anything else in the locality, or so far as can be learned, anything else in the State. Bounded by sedimentaries to the east and south and by granites to the northwest, this region is made up largely of metamorphic schists. Mica schists predominate, but grade off into chlorite schists, serpentines and similar formations near the junction with the granite. By some cataclysmic action during their formation these schists were stood on end, so that in crossing the region one constantly comes in contact with sharply defined ledges of schist rising above the surface of the ground at something near a 60 degree angle. These schist strata are here and there interspersed with quartz veins, bearing mute evidence of the great natural forces which worked to produce the metamorphosis of these formations. These quartz veins, occurring as they do, in almost vertical outcrops, have made prospecting quite easy, although sometimes complicated by the drift from wind erosion. The action of water, wind and frost along the beds of Rock Creek, Strawberry Creek, Willow Creek and their tributaries have formed placer deposits which have been worked since the earliest miners came to the district, and today are yielding handsome profits to modern dredging machines.

With regard to the history of this country, Coutant tells us in his history of Wyoming that gold in the Sweetwater district was first discovered in 1842 by a Georgian who came here with the American Fur Company. He was supposedly killed by Indians on his way home Thirteen years later a party of forty men prospected the whole length of the Sweetwater River, finding gold everywhere in the river as well as in all its tributaries.

Owing to Indian troubles, lack of provisions and hard winters, prospecting was done only intermittently from then until 1865, at which time the Lincoln Mining District was organized at South Pass—the first mining district in Wyoming. During this year a soldier named Tom Ryan discovered rich quartz on the property now known as the Carissa, but being unable to develop it on account of his duties, he reported his find in Salt Lake City. A party was sent out from there who, from Ryan's description, succeeded in finding the Carissa lode in 1867. Coutant says, "The rock was rich beyond anything that any of the party had ever seen; the walls were well defined, and there was every probability that a great producer had been discovered." The townsite of South Pass was laid out during the fall and a number of

houses built so that work could be carried on at the Carissa during the winter. The rich rock was pounded in mortars and by spring $15,000 in gold had been taken out in this primitive manner.

The early spring of 1868 brought miners from all the western states flocknig into South Pass City. By the middle of May the town contained hundreds of houses and thousands of people. Estimates of all the way from five to fifteen thousand people have been made for this period but cannot be verified since no count was made. During this season some wonderful strikes were made, including the Young America, the Carrie Shields, the Mohamet, the Duncan and others. Tom Ryan, who had been discharged from the army, returned and discovered the Carter lode, now known as the Gould & Curry. In the fall of 1858 the Miners Delight was discovered. The ore was free-milling and ran from $40.00 a ton up into the thousands. In 1869 a ten-stamp mill equipped with two amalgamating pans and a settler was installed. During the first six months of operation $300,000.00 in gold was turned out, and it is said that this property has since paid its owners in the neighborhood of $1,200,000.00. The mine is now filled with water and the mill in ruins, but experienced mining men claim the property is well worth operating with modern equipment.

By the spring of 1869 the towns of Atlantic City and Miners Delight had a large population and many other important properties were located that season. During a two or three year period at this time the placers in this district yielded close to $1,250,000.00.

Interest in mining continued for several years following this period of discovery, but as the bodies of free-milling ore gradually became exhausted, interest began to lag until finally, except for a few intermittent spurts, activity became practically dormant except for the efforts of a few old prospectors who managed to eke out a precarious living. Plenty of low grade ore existed, but lack of power, transportation and capital for equipment discouraged activity until in the last few years the advent of modern mining machinery with diesel power and automobile trucks for hauling concentrates, has again awakened interest in this district.

While gold is by far the most important mineral of this district, silver, lead and asbestos have also been mined, and platinum is known to exist. Platinum nuggets and dust have long been found in the sands of Strawberry Creek, but it became the pleasure of the author to locate its source. A secondary contact metamorphosis between the quartz and schist in the Lewiston district has created a hard brown rock which is more like an igneous formation than a metamorphic one. This rock quite often carries tiny streaks of quartz in such a way as to remind one of a batch of candy in which coloring matter has been imperfectly stirred and allowed to harden before mixture was complete. This rock has not been assayed for platinum, but gives a wonderful reaction to the Potassium Iodide test.

The Minerals Yearbook for 1935 gives the following information: "The Atlantic City district yielded 96.5% of the gold, 93.7% of the silver, 25% of the lead and 22.9% of the copper produced by Wyoming mines in 1934. Placer mines yielded 58.7% of the gold and 53.2% of the silver produced in the district. The chief production of gold in both the district and in the state was by the E. T. Fisher Company, operating a placer on Rock Creek, using a 1½ yard drag-line bucket and a washing, screening and amalgamating plant."

THE BENTONITE DEPOSITS OF MISSISSIPPI

By Frederic F. Mellen, Junior Geologic Aide, TVA

(Published with permission of the Tennessee Valley Authority)

If you will turn to a geologic or physiographic map of the United States and trace northwestward through the middle of Alabama, up through the northeastern tip of Mississippi, the western parts of Tennessee and Kentucky, the southern part of Illinois, and south again through the eastern parts of Missouri and Arkansas, southwestward into Texas, you will be describing a great basin, known as the Gulf Embayment, which in comparitively recent times—that is, since the angiosperms of flowering plants made their appearance on this earth—has filled completely up. A final uplift of this region gave us our Gulf Coastal Plains.

All of Mississippi lies within this province except a small portion of the northeastern-most county which is part of the great Central Paleazoic Area, the base upon which the sediments of the Gulf Embayment were deposited.

Bentonite, by most authorities, is considered a volcanic dust discharged into the air, transported by the winds, and deposited in depressions of the sea-floor or in lakes. The smoothness of the material, the abrupt appearance of it among other sediments, and the microscopic discovery of volcanic particles in bentonite are strong evidences of this origin. In the west-central and southwestern parts of Mississippi several volcanic necks enclosed by rocks of apparently the same age as some of the bentonite have been struck in deep wells, thus lending much strength to the theory. To its extreme fine grain, and to its highly adsorptive, bleacning, propertives, its value and use in many industries is due.

A dozen years ago bentonite was unheard of in the state. During the time elapsed, the mineral has been found in one tenth of the countries, and low grade bentonite in as many more. Beaded in with the marine and fresh water deposits of clay, sand, and limestone we sometimes see this remarkably pure, soapy, argillaceous mineral cropping out in roadsides or ravines, and almost always containing fossil shells or leaves of the age in which the bentonite was laid down.

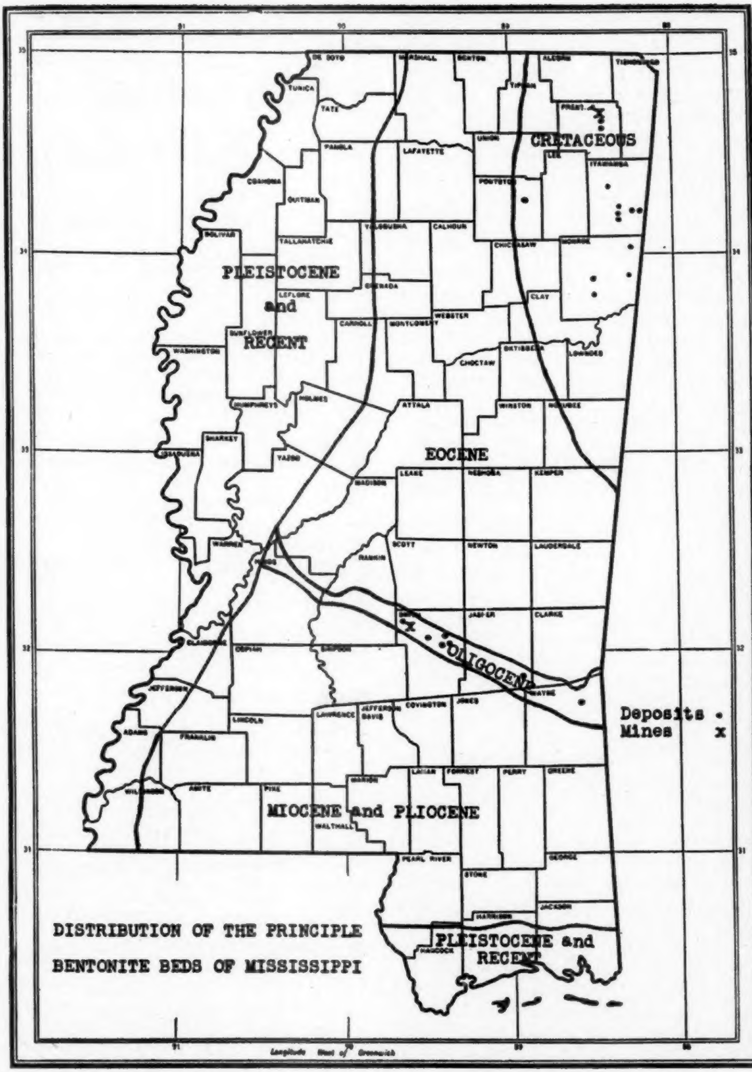
Bentonite is found in the state in sediments of Cretaceous, Eocene, and Oligocene periods. At least seven distinct ash falls occured during the Upper Cretaceous—a sufficient number to indicate that the volcanoes then existing to the southwest were far from being quiescent. At the beginning of Eocene sedimentation there was great volcanic disturbance, and the deposition of limestone was interrupted by the sedimentation of volcanic ash and mud, largely washed out to sea from the land. This formation, known as the Porter's Creek Clay, crops out in a belt hundreds of miles long, several miles wide, and is estimated as containing 30% bentonitic material. In Mississippi this belt lies immediately to the west of the Cretaceous outcrop. Again, toward the close of the Eocene there was deposition of ash. Then, finally, in the Oligocene beds are found some of the most important commercial deposits in the country.

The various bentonite beds range in thickness from a few inches to three or five feet, or more in rare cases; but the very thick ones generally are impure. Quite commonly it comes from the ground in large egg-shaped lumps. Some of it has a texture like wet meal and some is very smooth and waxy. Yellowish, greenish, bluish, and white are prevalent colors. By chemical tests the United States Geological Survey has shown many of the beds to be of the finest quality.

To the present, the Mississippi Geological Survey has published three bulletins on this important resource. A crushing and drying plant in the northeastern quarter of the state supplies the market demand with sev-

eral hundred tons of raw material each month. This year there has been built in Jackson a large plant costing $350,000 at which bentonite is to be prepared for use by acid-leaching, or activation. Considerable commercial interest is being paid to other deposits in the state.

Mississippi's mineral wealth lies chiefly in its clay. With its infant pot-



tery and brick industries it is shaping and burning back into rock form the clays of altered sediments washed from the decomposing rock of other regions in the course of its geologic history. For a time, at least, bentonite, whose spectacular discovery arouses so much attention to the mineral wealth of the state, will be the most valuable of the clays. Not only do we find in bentonite a product with a ready market, but the best evidence yet that the Gulf Embayment was not such a quiet basin of sedimentation all through its past as might be supposed, and that volcanoes once arose as islands in a shallow sea in the midst of what is now Mississippi, Louisiana, and Texas.

***Editor's Note*:— Just as we went to press, a letter from Mr. Mellen advised us that another deposit of bentonite has recently been discovered in the Cretaceous area, in southwest Itawamba County.**

BENTONITE

Such tireless water of a restless earth!
Though seeking never for repose itself,
It spends all time, unceasing, finding berth
For things along each continental shelf.

A sunset red along a southern shore
And landscape dim, and water not so clear,
Though still, construe that some few days before
Great rumblings blew into primeval ear,
And dark clouds drifted from the southwest sea
Where angry islands basked there underneath
The sun, and singly sent each wind-drawn wreath
To settle in the waves right quietly.

Then washed away the hills and higher lands
To cover deep the dust, and shells and sand;
So restless earth threw up her breast again,
And men came down to nourish on the plain.

THE RADIUM MINING AREA OF SOUTHWESTERN COLORADO

By RONALD L. IVES

The discovery of Radium by Pierre and Marie Curie, in 1898, and the uses found for this disintegrating element within the five years following its discovery, started a world-wide search for ores of Radium, and of its parent metal, Uranium. Within a few years, deposits of Pitchblende were located in Belgian Congo, northern Canada, and the eastern part of the United States. The deposits at St. Joachimstahl, Bohemia, (now Czechoslovakia) were already known at the time of the discovery of Radium, and much of the ore treated by the Curies during their experimental work came from these deposits. Carnotite, a vanadate of uranium and potassium, was discovered in Colorado, Utah, Portugal and Australia. Later, Autunite, a phosphate of uranium and potassium, was discovered at several locations in the western United States, and in Portugal.

An increased demand for both Uranium and Radium during and just after the World War led to the exploitation of the Carnotite area of southwestern Colorado and southeastern Utah. The greater portion of both actual work and exploration was done in Colorado, as the deposits in Utah were too far from a railroad to be profitably worked

The Radium mining area of southwestern Colorado is roughly included in the western halves of San Miguel, Montrose, and Dolores counties, in the southwestern quarter of Mesa county and in the northwestern quarter of Montezuma county. The region in general is a highly dissected plateau, with local topographic features modified by folding and faulting. Paradox Valley, in Montrose County, on the Dolores River, is the center of the Carnotite-producing area. The valley takes its name from the fact that the Dolores River crosses it by the shortest possible path, instead of following a seemingly logical course down the valley. Conditions of this sort are rather common in the plateau regions, and have not been any too well explained as yet. The course of the Dolores River through the Paradox Valley, however, has been carefully studied, and the best explanation seems to be that the river had established a definite course some time before the folding in the area occured. When the folding took place, it appears to have progressed slowly, and the river was able to erode a channel through the uplifted portions of its course. Several workers have expressed the opinion that the warping of the plateau region is still going on. The uplift is probably of post-Eocene age.

The Radium ore, Carnotite, is found in this area in the McElmo formation, of Cretaceous or Jurassic age. Overlying it is the Post-McElmo series of conglomerate, sandstone, shale and chert, which is definitely of Cretaceous age, and underlying the McElmo is the La Plata sandstone, of Jurassic age.

The McElmo formation, varying in thickness from 500 to 900 feet, is characterized by rapid successive changes from sandstone to shale to gypsum to conglomerate as one climbs up the outcrop. Individual beds change their texture in a very short distance, no single bed being continuous for any great distance. Plant remains are the only fossils so far found in the formation, and the presence of cross-bedding, channeling and gypsum suggest that the formation was deposited on a flood plain.

Carnotite is found throughout the formation, but the workable beds are located in two sandstone strata near the center of the formation. The first use of the mineral was in pre-Columbian times, when Indians found that it made a good face-paint. In 1899, Friedel and Cumenge made an approximate analysis of the mineral and named it Carnotite, in honor of

Adolphe Carnot, a French scientist. When it was discovered that all Uranium ores also contained Radium, the demand for Carnotite increased greatly.

Within the two strata containing commercial Carnotite, the ore is by no means continuous. The largest continuous mass of ore yet found was 450 feet long, 60 feet wide and 1 to 4 feet thick. This produced about 2,000 tons of ore. In general, the ore bodies are considerably smaller than this, and are described as "trees" (not of organic origin), "bug holes", "Pockets" etc. Extremely rich ore alternates with barren sandstone, and in places, the quality of the ore changes abruptly where the ore body crosses a joint in the containing rock.

A classification of the ore, as given by R. C. Coffin, will illustrate the extreme variety with which the miner has to contend.

"1. "Spotted ore" or "rattlesnake ore"—the uranium and vanadium minerals occuring in sandstone or shaly sandstone as dark blotches wherein vanadium-bearing minerals predominate, and as almond-shaped pieces and small fragments of shale or carbonaceous material speckled with carnotite.

2. Impregnated sandstones—the uranium and vanadium minerals cementing the sand grains.

3. Nearly pure carnotite or other minerals in seams, crusts, irregular vugs, and elongated masses called "bug holes".

4. Replacements of wood by carnotite or other minerals—ore often of extremely high grade.

5. Unusual ores—including bluish-black vanadium-bearing material and coal-black material carrying both uranium and vanadium."

Among the minerals present in the area are some which have never been thoroughly studied, and for which neither name nor formula are available. Carnotite, Hewettite, Metahewettite, and Torbernite, for which formulae have been determined, are present in most of the ores.

While the exact mechanics of the formation of the ore bodies has not been satisfactorily worked out, there are only two possibilities. The uranium and radium are known to be in a condition of equilibrium, which cannot take place until uranium has disintegrated for more than 500,000,000 years. Either the radioactive materials were deposited in their present condition (or very nearly so) at the time of the deposition of the beds (about 200,000,000 years ago), or they were introduced by some unknown means into the beds after their deposition, without changing the uranium-radium ratio. The best explanation to date, although by no means the final one, is that the minerals were introduced into the formation at the time of deposition, and that since the deposition of the McElmo formation, there has been redeposition along the joints and bedding planes.

The present production from this area is small, and vanadium is more of commercial importance in the area today than radium or uranium. This is due to the high cost of mining the ore, and of getting it to a mill, rather than to any fault of the ore itself. The value of the deposits is potential, rather than immediate.

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TEREDO LIGNITE ON LONG ISLAND, N. Y.

By JAY T. FOX

It is an established fact that Long Island was visited in the Pleistocene Era by all four Glaciers, the Mannetto, Jameco, Manhasset and the Wisconsin, and that during the second interglacial stage a considerable amount of clay (Gardiners Clay) was laid down, only to be later covered with moraines and tills of the two Glaciers which followed.

This clay varies from a few feet to perhaps one hundred feet in thickness in different parts of Long Island and there are a few prominent outcroppings known, principally at Glen Cove, Long Neck, Gardiners Island, Farmingdale and Bethpage.

These Glacial clays are well described in the United States Geological Survey, Professional Paper No. 82, "The Geology of Long Island", by Myron L. Fuller.

Bethpage however has by far, geologically speaking, the best exposure, as here clay banks of various colors, black, gray, blue, tan and brown have been exposed for a depth of seventy feet or more due to the activity of the Nassau Brick Company who has utilized this clay for many years in the manufacture of bricks for the building trade.

While exploring there a short time ago accompanied by James Carroll Jr., I ran into a piece of Lignite showing evidence of Teredo borings.

The finding of Lignite is not exactly rare at Bethpage and is occasionally encountered while exploring these Glacial clays, but to my knowledge this is the first time that a piece of Teredo Lignite has been reported from this locality.

The Teredo is a boring shipworm which only inhabits the salt water and it is safe to say that this find would tend to prove that the Atlantic Ocean came up to Bethpage in the Pre-Glacial period of Long Island. (Note:—Bethpage now is located approximately ten miles inland from the Great South Bay and approximately fifteen miles from the Atlantic Ocean.)

This specimen of Lignite is honeycombed with Teredo borings and is remarkable also considering that the original tree rings are visible on one end of the specimen.

The Genus Teredo, or common shipworm, is a wood boring species. It is classified under:

Phylum — Mollusca
Order — Eulamellibranchiata
Class — Pelecypoda
Family — Teredidae

It has a small three lobed shell on the forward end of its body and bores into submerged timber invariably across the grain by a rasping motion of the posterior valves. The hole made by the Teredo measures from six to ten mm. in diameter.

There are three species in the Atlantic Ocean today, namely, Teredo Navalis, Teredo Megotara and Teredo Chloritica.

As this specimen of Teredo Lignite was found at the lowest level of the clay and as these clays were laid down some 27,000 to 40,000 years ago according to recent estimates by Ernst Antevs, C. A. Reeds and others, it certainly opens up a field for thought concerning the antiquity of the Teredo.

While I fail to find any previous reports on Teredo Lignite, the MINERALOGIST and ROCKS and MINERALS recently reported some finds of Teredo Petrified Wood. (See notes below .

Dr. G. R. Wieland of Yale University quotes the rariety of Petrified Wood showing Teredo Worm holes in his book entitled "The Cerro Cuanrado Petrified Forest."

All these references, as you will note, cover Teredo Petrified Wood, completely silicified or jasperized with the Teredo holes filled with Chalcedony.

When found, this specimen of Te-

redo Lignite had the holes filled with clay and sand. This material was removed in the washing leaving perfectly round exidences of the borings. No doubt if this specimen had remained undisturbed for perhaps a few million years longer, it too would have become completely carbonized and the clay filled borings would no doubt have become silicified.

The writer is very much interested to know if any fellow members of the ROCKS AND MINERALS ASSOCIATION have ever run across a similar specimen?

REFERENCES:—

Sept. 1935 MINERALOGIST by Guy Hughes
Nov. 1935 MINERALOGIST by Dr. E. Lazell
Dec. 1935 MINERALOGIST by Jack Wharton
Mar. 1936 ROCKS & MINERALS by J. R. Wharton.

DEFINITION:—

LIGNITE—A compact carbonized wood. retaining fibrous structure forming an imperfect fuel intermediate between peat and true coal, abundant in Cretaceous and Tertiary strata. Commonly called brown coal.

. . . OLD LABELS . . .

By LEO N. YEDLIN

Now and then I acquire an "old timer" in the line of mineral specimens, either by purchase or exchange, and no little part of my satisfaction has been derived from the historical as well as the mineralogical information that such mineral gives, particularly when it comes with an old or original label. Some of the specimens I have bear the names "Niven & Hopping", "L. W. Stilwell", "Roy Hopping", "George L. English & Co." at various addresses in New York and Philadelphia, "Lazard Cahn", "George O. Simmons", "George F. Kunz", "Frederick Braun", and a number of others, familiar to the older collectors as contemporaries, but to me rather legendary figures, men with interests similiar to mine, some of whom, because of the fact that collections outlive their collectors, I shall never meet.

The labels tell, too, of the men themselves, for the method of describing the specimen, and the care and exactness in recording information about it, seem to give a picture of the individuals, and the depth of their love for the science—whether they be collectors, mineralogists or dealers.

Some of these identification tags still bear the prices paid for the specimens, and it is interesting to compare the value of a specimen years ago with its value today. Commodity prices change constantly: automobiles, books, food, clothing, furniture, land and most everything else; but the labels of minerals bear witness to the fact that values here are standard. A good specimen is always worth a little more than its cost to the purchaser.

Some of the paper labels had so deteriorated during the course of time that they would not bear any handling whatsoever. Several methods of preservation were tried, and the following proved most satisfactory:—

Coat one side of a small piece of linen paper, slightly larger than the label to be preserved, with clear lacquer or Duco cement. Place the label, face up, upon this prepared backing and permit to dry. If the label is soiled, use a soft gum eraser to clean. Coat the upper surface with the lacquer, let dry, and trim to size. The label will last indefinitely, and may be cleaned with a damp cloth.

Where the label has broken to fragments, place the pieces in a shallow dish filled to a quarter inch with lacquer. Soak for about ten minutes. Prepare the backing as before, but do not coat the backing. With forceps place the fragments, wet with lacquer, but firm now, on the backing, fitting the parts together, and dry. Trim to size. The result is good restoration.

Age seems to break the fibres, and the lacquer or cement, cellulose products, renew and old paper, making it firm and pliant. The backing and lacquer act as a coating, forming a protection against air and temperature change.

Nothing is so beautiful as a fine mineral specimen. The joy of examining a new acquisition, wrapped in an old newspaper describing some historical event, is greatly enhanced by the discovery inside of a small square of paper, naming the mineral, giving its locality (now different in name by reason of political upheaval), describing the specimen, and bearing the appellation of a collector whose foresight enables me to learn and keep alive the story of the mineral. It somehow acts as a link between the present and the past.

TRANSPORTED PEBBLES

By ELIZABETH KING

The finding of a feldspar pebble in sandstone, described by H. R. Williams in ROCKS AND MINERALS for July, is interesting. Mr. Williams' theory that his pebble was transported by floating vegetation seems probable. Similar pebbles in my possession have all been transported by floating ice. I have a glaciated pebble raised by Captain Bloomer of the cable ship "Lord Kelvin" from the bottom of the north Atlantic, Lat. 50° N., Long. 40° W. This was probably dropped from a floating iceburg. My second specimen is a Blomidon amethyst which was carried by floating ice across Minas Basin and left on Partridge Island, Nova Scotia. Ice is also responsible for picking up pieces of slag from the old Cunard Iron Works on Moose River, Clementsport, Nova Scotia, and transporting them up and down Annapolis Basin. All of these cases are of recent occurence and the method of transportation self-evident. I have found isolated, water-worn pebbles near Halifax, Nova Scotia, in precambrian quartzite as recorded in Proc. Nova Scotian Inst. Sci., XIX, p. 117 (1935), where I make the suggestion that they also have been dropped by floating ice.

The advertiser likes to know whether he gets returns for his money spent in advertising. If you mention ROCKS and MINERALS when writing him, it puts him in good humor. It is little trouble and it renders business transactions pleasanter to all concerned.

SEWER STALACTITES

By Wm. D. QUINN

A few years ago some friends brought to my attention the occurrence of "Limestone icicles" in a nearby surface sewer. Though I had my doubts, I investigated promptly.

Once in the sewer which is a long tunnel, lined with concrete, (in West Roxbury, Mass.), we walked several hundred feet until we reached the region where the stalactites were. The roof was virtually covered by them with small drops of limy matter glisening in the candlelight. They averaged from about 2 to 3 inches, though some as large as 10 inches were found. The reason for their brittleness and easy crumbling is probably explained by the fact that they drip so often they do not have a chance to dry properly.

These stalactites effervesced under hydrochloric acid, showing the presence of some salt—possibly calcium carbonate. Indistinct feathery crystals were found under the microscope. The most remarkable thing about these stalactites is their reaction when under the ultra violet rays. When subjected to the argon bulb they gave off the most beautiful and brilliant green phosphorence I have ever seen.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of ROCKS and MINERALS published MONTHLY at PEEKSKILL, N. Y., for OCTOBER 1st, 1936. — State of New York, County of Westchester.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared PETER ZODAC, who, having been duly sworn according to law, deposes and says that he is the EDITOR and PUBLISHER of ROCKS and MINERALS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor, managing editor, and business manager is. PETER ZODAC, PEEKSKILL, N. Y.

2. That the owner is: PETER ZODAC, PEEKSKILL, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC

Sworn to and subscribed before me this 3rd day of October, 1936.

MAUD L. BARRETT

My commission expires March 30, 1938.

MINERAL ODDITIES

MINERAL MOONLIGHT

I have often heard of selenite being called "mineral moonlight" without ever seeing this phenomenon in the mineral; or perhaps, putting it in another way, without having it brought to my attention.

One day a common, ordinary crystal, about 2x2 inches in size, (from Nova Scotia), was lying on my desk. It was not considered of much value and I would gladly have given it away to the first person who would want it—in fact I even felt like throwing it away.

That late afternoon I happened to approach the desk, towards the light, when suddenly a beautiful silvery light apparently glowed upon the desk. For a moment I stopped in astonishment—and then I saw what it was. Yes, you have guessed it. It was the very common ordinary selenite crystal. It was glowing as if its little heart (if it had one), would burst asunder. And the reason was soon apparent. The rays from the sun happened to strike the crystal at just the right angle.

Was the crystal thrown away? I should say not. It is now one of my prized possessions.

P. ZODAC.

THE AMATEUR LAPIDARY

Conducted by J. H. HOWARD*
504 Crescent Ave., Greeneville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

***Author of—*The Working of Semi-Precious Stones*, and *Handbook for the Amateur Lapidary*.**

. . . GEM POLISH . . .

NOTES ON PROBABLE NATURE OF POLISH

By DR. FRANK B. WADE

When we "fire polish" glass we cause it to **flow** and its surface, which, if rough and broken to start with, was only translucent, becomes transparent. We are here dealing with an amorphous substance and we have an amorphous surface. When we polish glass, after we have dressed the surface down with abrasives harder than the glass, we resort to a material such as rouge (which is probably unable to scratch glass) to get our final polish. We use pressure and speed and develope heat and do we not probably cause the surface layers to **flow?**

When we polish a crystalline gem material we again resort to an abrasive harder than our material and dress the surface down until the irregularities are minimized. Then we use in most cases a polishing powder which is the dust of a mineral softer (in scratch hardness) or at least no harder than the material to be polished. (There are certain exceptions as when we use very fine diamond dust to polish ruby or sapphire). Does not our "tripoli" for example, cause the surface particles of, say topaz, or spinel or even sapphire to flow? It is said that at sufficiently high speed a tallow candle can be shot thru a board fence. The tripoli acts like the candle to overcome that which is harder by its surprise attack, its speed, the friction and the heat doubtless playing an important part in the case of polishing. As further evidence of this thesis note that it is very much easier to polish a small facet than a large surface and that you are practically compelled to polish the latter by stages or small parts at a time, **the edge**, of a felt buff acting better than the **side** in such case because more pressure per square millimeter can be thus developed. Again, it was noted by some one (In the Mineralogist I think) that when trouble was had in polishing a facet and the surface was streaked and furrowed one could get a fine finish by merely reversing the direction of surface travel and (I say) **causing the displaced material to flow back where it came from.** Another evidence of the changed character of a polished surface is had when attempting to dye minerals. A fresh surface is necessary according to very good authority. A weathered surface does not take the dye well and my own limited experience is that neither does a polished surface. When you polish you perhaps cause the surface particles (ions or atoms) to **flow** and thus plug up any porosity that might have been present.

To get scientific proof of my thesis it might be possible to use an X-ray method. For example, if there is really a thin amorphous layer at the surface a long exposure might bring out the type of pattern characteristic of such material while at the same time greatly overexposing the Laue diagram pattern due to the space lattice of the internal chrystalline material. This might be worth trying if someone with the necessary apparatus has the interest to attempt it. A similar ex-

posure with a cleavage of the same material of the same thickness and in the same direction as related to the crystal axes might be made. Colorless topaz would afford a good material because of its perfect basal cleavage altho it is difficult to get a perfect polish parallel to that cleavage. This latter fact in itself is in favor of our thesis for the particles slough off or flow all too freely when we attempt to polish along the weak direction; the whole neighborhood slips instead of individual particles.

Another bit of evidence comes from the character of the surface luster of certain gem materials in the polished condition as against the luster of the natural crystal surface or a fractured or cleaved surface. Polished olivine (peridot) has an oily luster not like the luster of a fractured surface. Sulphuric acid is said to be used by some lapidaries in polishing peridot and here we assist the flow by chemical means. Similarly oxalic acid is sometimes used in polishing marble. The simple use of the acid does not give the smooth even polish. Friction is necessary along with it to get good results, indicating the need for **flow.**

When we polish sapphire or ruby with floated diamond dust we undoubtedly scratch the surface with coarser powder in preparing it for the final polish. Do we still continue to scratch it with our twenty four hour dust (which settles in olive oil for that length of time after all coarser particles that fall in an hour have thus been removed)? If so the lines are too fine to be picked up with a loupe by reflected light. We use considerable speed and pressure and develope a lot of heat at the surface even when using fine diamond dust and oil on a boxwood lap in finishing ruby. We mav still be bringing about **flow** in the final stages. Let those who are interested in this problem think up other evidence pro or con and other ways of getting evidence.

A PEEK AT OUR MAIL

A Mighty fine issue!

Brooklyn, N. Y.—Received my copy of the 10th Anniversary Number of ROCKS *and* MINERALS. It is a mighty fine issue. I heartily compliment you.—John A. Grenzig

Improves Steadily!

Allentown, Penn.—I have noticed a steady improvement in the magazine since it became a monthly. Keep it up.—Allen Heyl, Jr.

Rocks and Minerals is the Solution!

Lynn, Mass.—Today's mail delivered my copy of ROCKS *and* MINERALS—words fail to express my delight and enthusiasm over your most interesting magazine.

Have spent much time seeking a new hobby that would not only be of continual interest and diversion but also educational, of a natural, not man-made substance, with some outdoor possibilities and exercise. The contemplated mineral trips offer such a hobby and ROCKS *and* MINERALS is my solution.—Harold W. Ryall.

Consumed with Anxiety!

Hamden, Conn.—Have not received the Sept. issue of ROCKS *and* MINERALS. Each day is agony. I am consumed with anxiety. Hope you have a copy left for me.—Harry Neale.

Cannot do without R and M!

Hartford, Conn.—Haven't been active in the mineral line this summer because I have had to work long hours. But I cannot do without ROCKS *and* MINERALS and so am sending in my renewal.—Karl Proctor Perry.

A Pat on the Back!

Boulder, Colo.—I would like to give Mr. George M. Colvocoresses a verbal pat on the back for his article *Meteor Crater* in the August R & M. It was an extremely good handling of a rather controversial subject.—Ronald L. Ives.

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HOW TO COLLECT MINERALS by PETER Zodac. A complete guide book for the mineral collector, 80 pp., 15 illus. price $1.00. Rocks and Minerals, Peekskill, N. Y.

HANDBOOK FOR THE AMATEUR LAPIDARY by J. H. Howard. 16 chapters covering all phases of gem cutting and polishing, 150 pp., 44 illus., price $2.00. J. H. Howard, 504 Crescent Ave., Dept. R. Greenville, S. C.

CURIOS

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